

# **Report on the Competitive Effects of Exclusive Contracting for Video Programming Services in Multiple Dwelling Units**

by

**Michael D. Whinston**

**March 2, 1998**

1. My name is Michael D. Whinston. I am currently a Professor of Economics at Harvard University, where I have taught since 1984, and a Visiting Professor of Economics at Northwestern University. I have recently accepted an endowed chair at Northwestern University as the King Professor of Business Institutions, effective September 1, 1998. I received my Ph.D. from the Massachusetts Institute of Technology in 1984, my M.B.A. from the Wharton School of the University of Pennsylvania in 1984, and my B.S. in Economics from the Wharton School of the University of Pennsylvania in 1980. Since receiving my Ph.D., I have taught courses in Industrial Organization (Ph.D. level and undergraduate) and Microeconomic Theory (Ph.D. level).
2. I have published extensively in academic journals on the topics of industrial organization and microeconomic theory. I have received a number of awards and professional recognitions, including an Alfred P. Sloan Foundation Research fellowship, election as a Fellow of the Econometric Society, a fellowship at the Center for Advanced Study in the Behavioral Sciences, and National Science Foundation research grants. I have also served as a Co-Editor of the *Rand Journal of Economics*, the leading professional journal in the field of industrial organization, and on the editorial boards of

other professional journals. Within the area of industrial organization, a number of my articles deal with the topic of exclusive dealing contracts.

3. I have been retained as a consultant and/or expert witness on matters of antitrust policy in numerous matters, including by the U.S. Department of Justice.

4. A copy of my curriculum vita is included as Appendix A to this report.

#### **SUMMARY OF OPINIONS**

5. I have been retained by the Independent Cable and Telecommunications Association (ICTA) and its members to analyze the competitive effects of exclusive contracts between multichannel video programming distributors (MVPDs), primarily private cable operators (PCOs), and multiple dwelling unit owners (MDU owners).

6. In the course of analyzing competition in the market for video programming in MDUs, I have examined documents and reports relevant to competition in this market, I have reviewed comments filed in this proceeding, and I have interviewed a number of PCOs and MDU owners.

7. My analysis leads me to believe that there is little risk of competitive harm arising from the use of exclusive contracts by PCOs. The very low levels of economies-of-scale present in the PCO distribution technology indicates that a PCO is highly unlikely to be able to use exclusive contracts to reduce competition in the MDU market and earn supra-normal profits. Moreover, exclusive contracting with PCOs serves an important pro-competitive role in this market, and in particular, may be essential for assuring the competitive participation of PCOs in this market.

8. Given the low risk of any anti-competitive effects arising from PCOs' use of such contracts, and the important pro-competitive role that they play in the market, the FCC

should be very cautious about imposing administrative limits on PCO's use of exclusive contracts, and about imposing administrative limitations on their duration, over the judgements of the marketplace. Particularly detrimental would be any limitations that jeopardize PCOs' abilities to recover their investments and thereby compete effectively in the marketplace.

#### **ANALYSIS OF POTENTIAL ANTICOMPETITIVE CONCERNS**

9. As a general matter, sophisticated parties contracting in a complex environment may find it optimal to write contracts that differ from the simple types of exchange contracts contemplated in the classical perfectly competitive model. For example, these contracts may include incentive provisions, they may give one or another party options of whether and how much to trade, and they may include exclusivity provisions.

10. Such contracts can serve a variety of purposes. Typically, they are adopted for pro-competitive, efficiency-enhancing purposes. Sometimes, however, they may be employed to achieve anti-competitive ends.

11. When two parties writing a contract choose to include a provision such as exclusivity, it may be presumed that such a contract is an efficient choice for the parties in the sense that it maximizes their joint payoff (i.e. their monetary and other benefits). Were this not the case, there would be an alteration of the contract that, when combined with an appropriate monetary transfer between the parties, increases both parties' individual payoffs. This observation leads to a first principle for evaluating the anticompetitive potential of an exclusive contract: to present a threat to the efficiency of market outcomes, the exclusive contract must generate some kind of external effect on third parties. In

general, these affected parties could be other buyers or sellers in the market, or even participants in related markets.

12. A second principle is that for an anticompetitive exclusive contract to be signed, the third parties who are impacted by the contract must not be present in the bargaining and negotiations over the contract in question. The reason for this is that, if they were, these parties would have an ability and an incentive to make offers to mitigate the negative impacts they anticipate from the contract in question. Thus, if the contract in question is signed despite these efforts, we must conclude that it is efficient.<sup>1</sup>

13. As an example of these two principles, it is instructive to consider an economic model of a hypothetical situation in which two sellers compete for the business of one buyer. Suppose that the first seller would earn 2 absent an exclusive contract and 6 with an exclusive contract, that the second seller would earn 0 if the first seller has an exclusive and 1 if the first seller does not have an exclusive, and that the buyer would have benefits of 2 if the first seller has an exclusive contract and 3 if the first seller does not have an exclusive contract. What will be the outcome of negotiations in this case? Note that the second seller is willing to offer the buyer up to 1 to *not* sign an exclusive contract with the first seller. Thus, including this payment, the buyer sees a net benefit of 4 if he does not give the first seller an exclusive contract, and 2 if he does. Hence, the first seller will need to pay the buyer 2 to sign the exclusive contract. In the present case, he will find this worthwhile (since his extra benefit from an exclusive is 4) and an exclusive contract will be signed. Note, however, that this outcome is *efficient* here – an exclusive contract results in an aggregate payoff of 8 (6 for the first seller and 2 for the buyer), while the aggregate

payoff is only 6 without it (2 for the first seller, 1 for the second seller, and 3 for the buyer).

14. By way of contrast, suppose instead that the first seller receives a payoff of only 3 under an exclusive contract. In this case, an exclusive would not be efficient (total payoffs would be 5 with an exclusive and 6 without an exclusive). Note, however, that the first seller would also not find it worthwhile to pay the buyer to obtain the exclusive: he would need to pay the buyer 2 for the exclusive, but would gain only 1 from it.

15. Indeed, these observations reflect a very general point: when all affected parties are involved in the negotiations over the exclusive contract, *the exclusive contract will be signed precisely when it is efficient.*<sup>2</sup> Among other things, note that this tells us that the “lock-up” of the buyer for the period of the exclusive should not – in and of itself – be a cause of concern. This is in notable contrast to the view sometimes expressed by some observers that exclusive contracts are inefficient because they “eliminate choice.” Rather, if competition at the contract formation phase works well (in the sense that all affected parties are involved in the bargaining process), then contracting outcomes will be efficient.

16. The lesson that follows from these two principles is that to identify cases in which exclusive contracts are signed with anti-competitive (i.e. inefficiency-causing) effects, we must identify third parties who are negatively impacted by the contract, and who are not part of the negotiations over it.

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<sup>1</sup> This is a version of the well-known Coase Theorem: if all interested parties are able to bargain together, efficiency is achieved.

<sup>2</sup> Indeed, this remains true when other contracting possibilities (such as an exclusive contract with seller 2) are allowed. For a general statement of this result, see B.D. Bernheim and M.D. Whinston, “Exclusive Dealing,” *JPE* (106), February 1998, pp. 64-103, Sections II and III.

17. One set of parties who may at first appear not to be part of the negotiations are tenants. However, such an appearance would be deceptive. Because of the competitive nature of the market for real estate rentals, MDU owners are forced by the marketplace to act as *de facto* representatives, or proxies, for their tenants. To not do so would be to place their ability to rent their units at jeopardy. Or, put slightly differently, in a competitive marketplace, if an MDU owner is able to increase the value of being a tenant in its building by some amount (say, through arranging for better cable service), it can capture this through increased rental levels. Thus, MDU owners have every incentive to act as effective proxies for their tenants in negotiations.<sup>3</sup> Moreover, with their increasing level of sophistication, MDU owners have every ability to do so as well.

18. Given that tenants are effectively represented, the leading case in which problems could in principle arise occurs when significant scale economies are present in the efficient method of production and distribution in a market. In such a situation, a firm needs to be able to capture a significant share of business in the market to be a viable competitor. As a result, if one firm is able to sign enough buyers (here, MDUs) in the market to exclusive contracts, other firms will be unable to enter and compete for business. This creates precisely the sort of negative externalities described above, because when a buyer (MDU) signs an exclusive contract it reduces the likelihood of future competition in the market, and thereby has a negative effect on other buyers (MDUs).<sup>4</sup> Moreover, buyers are

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<sup>3</sup> It is instructive to note in this regard that the contracts signed by cooperative associations for video programming services look very much like the contracts signed by MDU owners.

<sup>4</sup> See, for example, B.D. Bernheim and M.D. Whinston, "Exclusive Dealing," *JPE* (106), February 1998, pp. 64-103, Section IV; E. Rasmusen, J. M. Ramseyer, and J. S. Wiley, Jr., "Naked Exclusion," *American Economic Review* (81), December 1991, 1137-45; and I. Segal and M.D. Whinston, "Naked Exclusion and Buyer Coordination," Harvard Institute of Economic Research Discussion Paper No. 1780, September 1996.

typically not involved in each others' negotiations, and so have no means for mitigating these effects.

19. However, a notable fact about the provision of video services by PCOs is that the efficient scale of operation for these operators is very low relative to a typical market's size. PCOs offer service to an MDU primarily in one of two ways. The first possible method involves installing a dedicated headend for reception of satellite signals for that MDU; the signals are then distributed via wiring internal to the MDU from this headend to individual dwelling units. The second involves instead reception of a signal via microwave transmission from a headend facility located on another building. The number of buildings that can be served in this manner from a single headend is limited by the fact that microwave signals require line-of-sight transmission, by the fact that they are effective only up to a distance of approximately 3-8 miles, and by the fact that physical space and other limitations typically exist that significantly limit the number of microwave transmissions that can be made from a single headend facility. Indeed, my understanding is that it is very rare for a single headend to serve more than 5-10 buildings. The result of these facts is that, to a great degree, the costs incurred by a PCO in providing video services are incurred on an MDU-by-MDU basis. That is, economies of scale in signal reception and distribution are very minimal for PCOs.

20. This is not to say that signal reception and distribution are the only costs incurred by a PCO in serving a local market. A PCO must maintain both marketing and service staff in a local market. But even with these costs, PCOs typically see themselves operating at an efficient scale when they have approximately 10,000-20,000 passings in a local marketplace, or assuming a 60% penetration rate, roughly 6,000-12,000 subscribers.

In fact, in a survey that ICTA recently sent to some of its members, the respondents (who included a number of the largest PCOs) had an average of 10,060 passings and 5,412 subscribers in the cities in which they were active. This number is very small when compared to the number of potential subscribers in most major, or even medium-sized, cities. For example, in 1995 the franchised cable operators in Chicago served a total of 335,000 subscribers; in San Francisco this number was 174,450; in San Diego it was 678,474; in Memphis it was 157,209; and in Seattle it was 431,352.<sup>5</sup> Even if one focuses on just MDUs, the number of potential MDU subscribers in these cities is clearly very large compared to an efficient scale of 9,000-12,000 subscribers (For example, the FCC's *Fourth Annual Report* on the state of competition in markets for delivery of video programming notes that as of 1990, MDUs contained roughly 28% of the total housing units nationwide; the share of total housing units in even a medium-sized city would obviously be much higher).

21. Another notable feature of the current contracting environment for contracts with MDU's is its highly competitive nature. This fact was explicitly noted in the FCC's *Fourth Annual Report*. There, the Commission notes "the emergence of a distinct MDU market, which is more competitive than other MVPD markets." (p. 76) It goes on to comment that the "competitive strategies of a number of firms that are focusing on the MDU market illustrate what appears to be a developing competitive trend for this market." (p.77) Indeed, PCO's must compete not only against the established franchised cable operator in a market (who has all of the advantages of incumbency, including buyer

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<sup>5</sup> See the 1996 issue of the *Cable Fact Book*. These numbers represent the number of subscribers within the city limits. The number of subscribers would be much larger if we instead looked at the overall metro areas.

awareness), but also against each other, and increasingly against services provided by local telephone operators (LECs) and direct broadcast satellite (DBS) providers (see the *Fourth Annual Report*, p. 77). The contracting environment is made all the more competitive by the increasing sophistication and size of the MDU owners who are seeking contracts for video services on their properties (see again, the *Fourth Annual Report*, p. 77). In fact, the survey information recently collected by ICTA indicates significant competitive interaction even among PCOs. The respondents to this survey were 6 PCOs, including three of the four largest PCOs. Across the 45 cities in which these PCOs currently are serving subscribers, on average 1.24 of the 6 were active. That is, in roughly one quarter of these cities, 2 of the 6 respondent PCOs were already serving customers. More significantly, however, these responding PCOs also reported which other PCOs were current competitors in each of these cities. On average, there were 2.87 PCOs currently competing in these cities. Since this survey was potentially far from fully inclusive, these numbers should be thought of as lower bounds on the true number of PCO competitors.

22. We have already noted that in the absence of any economies-of-scale, negative externalities across buyers would not arise, and with all sellers actively competing for contracts there would be no ability to use exclusive contracts for anti-competitive ends. Even though there are *some* economies-of-scale in PCO delivery, their extremely low level makes it highly unlikely that any PCO could profitably seek to use exclusive dealing contracts for anti-competitive ends. It is simply not feasible for a PCO to effectively eliminate competition from other PCOs, and thereby gain the freedom to price non-competitively in the MDU segment of the video programming distribution market, without

signing up essentially all of the MDUs in a city. The likelihood that such a strategy would prove profitable seems very remote.<sup>6</sup>

23. It is worthwhile noting that using exclusive contracts for anti-competitive ends may be a more plausible strategy for a franchised cable operator. In particular, for a franchised cable operator, the most efficient source of competition in the future may not be entirely clear at this point. In the event that PCOs turn out to be the most efficient alternative provider, exclusive contracts will help reduce competition for the franchise cable operator only if essentially all MDUs are signed up to exclusives. However, in the event that delivery by methods akin to those currently used by franchised cable operators turn out to be the most efficient alternative means of service to the franchised cable operator (i.e. if delivery by a LEC is much more efficient than delivery by a PCO), then because such means of delivery are characterized by substantial economies-of-scale, exclusives may well turn out to be a means for insulating the cable franchise operator from competition. Here, a franchised cable operator may foresee the possibility of future states of the world in which having a significant number of exclusive contracts with MDUs would reduce the extent of competitive pressure it faced.

24. Moreover, franchised cable operators signed many MDUs to very long-term, and even perpetual, exclusive contracts well before any alternative providers were on the scene. At the time these contracts were signed, the owners of these MDUs may well not have foreseen *any* possibility of future competition in the video programming distribution,

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<sup>6</sup> For a more explicit statement of this point, see I. Segal and M.D. Whinston, "Naked Exclusion and Buyer Coordination," Harvard Institute of Economic Research Discussion Paper No. 1780, September 1996.

and so it would have been particularly easy for the franchised cable operator to induce an MDU owner to accept an anti-competitive contract.

### **PROCOMPETITIVE ASPECTS OF EXCLUSIVE CONTRACTS**

25. Exclusive dealing contracts can also serve important pro-competitive functions by making exchange relationships work more efficiently. One way in which this can happen is through the effect of an exclusivity provision on the investments undertaken by the parties to the contract. In particular, the economics literature has studied the ways in which exclusivity might affect investments that cannot be explicitly specified in the parties' contract (in the language of the economics literature, these are "non-contractible investments").<sup>7</sup> As I discuss below, such issues are potentially important ones in the context of the sale of video programming in MDUs, and in fact have some potentially important ramifications for the level of competition in these markets.

26. In the contracting problem facing PCOs and MDU owners, the initial investments of the PCO, their initial programming, and the prices to be initially charged are largely able to be contractually specified. What is much more difficult to specify contractually is the level of these items in the future. Future technologies are hard to imagine in the present, and therefore a contract cannot readily specify a PCO's or franchised cable operator's investment obligations in the future. Likewise, future programming is unknown, as are

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<sup>7</sup> See, for example, B. Klein, "Vertical Integration as Organizational Ownership: The Fisher Body-General Motors Relationship Revisited," *Journal of Law, Economics, and Organization*, 1988 (reprinted in S. Masten, ed. *Case Studies in Contracting and Organization*, New York: Oxford University Press, 1996); S. Masten and E. Snyder, "United States v. United Shoe Machinery Corporation: On the Merits," *Journal of Law and Economics*, 1993 (reprinted in S. Masten, ed. *Case Studies in Contracting and Organization*, New York: Oxford University Press, 1996); H. Marvel, "Exclusive Dealing," *Journal of Law and Economics*, 1982, 1-25; and I. Segal and M.D. Whinston, "Exclusive Dealing and Protection of Investments," 1997, mimeo.

future programming tastes of consumers, and so it is difficult to specify what programming and price should be in the future. It is true that a recent trend in the contracts between MDU owners and PCOs has been toward the inclusion of some contractual provisions, such as technological most-favored-nation-type clauses, that offer the MDU owner some protection (such a clause might say that the PCO must keep the technology in the building up to "prevailing standards" or the PCO's "current standards elsewhere in the MDU's market area"). But such provisions are likely to offer far from complete protection, and the attempt to include them seems to indicate, more than anything else, the importance of the issue.

27. A significant concern regarding future investments within an MDU involves the incentives for an MDU owner to allow, or even encourage, an inefficient over-build (or upgrade investment) by a second cable provider once a PCO has made an initial investment in a building. In the case of a new MDU where a PCO is the first provider to wire the MDU, this could involve bringing the local franchised cable operator into the MDU. Where the local cable franchise operator is already in the building, the issue may be the incentive for the franchise holder (possibly encouraged by the MDU owner) to upgrade its facilities.

28. Without an exclusive contract, there is nothing to prevent such over-building. However, such overbuilding may very well be inefficient. Moreover, the prospect of such overbuilding may make the PCO unwilling to invest in the MDU in the first place.

29. To illustrate these points, consider the following simple example. Suppose that there is a new MDU and that a PCO must invest 220 to serve this MDU. The local franchise operator on the other hand, needs to invest 50 to serve the building (its costs

may be lower because it need not install any reception equipment – its signal is already just outside the MDU). There are 300 residents in the building. Of these, 100 of them are happy to receive their service from either cable provider and have a value of 1 from cable service. The remaining 200 residents are only interested in the services of the PCO, and receive a value of 1 from these services. (This is a simple way of capturing the fact that the PCO is likely to be able to provide a higher value product, in part because its channel capacity may be greater, but more significantly because it can tailor the programming it offers in the MDU to the particular attributes of the MDU's residents.) If just the PCO serves the building, it will charge each resident 1 for cable service and earn 300 in subscriber fees. If just the franchised cable operator serves the building it will charge 1 for service and earn 100 in subscriber fees. Finally, we suppose that in the event that both the PCO and the franchise operator serve the building, then the PCO serves the 200 consumers who value only it, while the MSO serves the remaining residents (at a price of 1). Hence, in this event the PCO earns 200 in subscriber fees and the franchised cable operator earns 100 in subscriber fees.<sup>8,9</sup>

30. Note, first, that in this setting, the efficient outcome is for only the PCO to serve the building – aggregate surplus is 80 in this case (gross consumer value is 300, and investment costs are 220), while it is 50 if the building is served by only the cable franchise operator (gross consumer value of 100, less investment costs of 50), and it is 30 if both

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<sup>8</sup> The same conclusions can follow whether or not firms start undercutting each other when they are both in the building. Although I will not go through such an example here, similar effects can arise: the MDU owner may encourage inefficient over-building, leading the PCO to lose money if it enters the building, and ultimately resulting in the PCO being unable to compete. In such cases, even though having both providers in the MDU would lower prices, lower prices never materialize when exclusives are banned.

<sup>9</sup> For simplicity, we assume that there is only one period of sales. Alternatively, we can view the stated valuations of residents as the present discounted values of their valuations.

cable providers serve the building (gross consumer value of 300, less investment costs of 270).<sup>10</sup>

31. Suppose that exclusive contracts are not allowed and that the PCO and MDU owner reach an agreement whereby the PCO invests to serve the building. Once the PCO has invested, the building owner and the cable franchise operator have an incentive to reach an agreement whereby the cable franchise operator invests in providing service to the MDU as well. By doing so, the cable operator will earn subscriber fees of 100, while incurring an investment cost of only 50. However, note three things. First, this decision is socially inefficient – allowing the MSO into the building creates no additional consumer benefits here, but incurs an investment cost of 50. The reason that it pays for the cable operator to enter the building (or upgrade) is that in doing so he steals some of the PCO's business.<sup>11</sup> Second, if the MDU owner will allow the cable franchise operator into the building once the PCO has invested, the PCO will lose money: he will invest 220, but earn only 200. Third, the end result of this will be that the PCO will not be willing to invest at all – the MDU will be forced to contract with the MSO, yielding a socially inefficient outcome.

32. One might wonder about alternative arrangements to exclusive contracts that could be used to circumvent these problems. One possibility is that MDUs could write

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<sup>10</sup> I am ignoring any costs of programming acquisition here, but we can equally well think of the residents' valuations as net of these costs.

<sup>11</sup> For more general discussions of this type of inefficiency and the role of exclusivity in limiting it, see I. Segal and M.D. Whinston, "Exclusive Dealing and Protection of Investments," 1997, mimeo; a similar point arises in the literature on free entry and social inefficiency, such as N.G. Mankiw and M.D. Whinston, "Free Entry and Social Inefficiency," *Rand Journal of Economics*, Spring 1986, 48-58. Note that if prices were bid down for cable service due to the cable operator's entry/upgrading then it would still be true that the cable operator and the MDU owner might *jointly* find it optimal to facilitate this entry given that the MDU owner internalizes the reduction in residents' cable expenses that this entry would

bulk contracts with PCOs, thereby assuring them business without writing an exclusive contract. In fact, bulk contracts are written in the marketplace, particularly with condominium and cooperative associations. However, from the standpoint of an MDU owner, such contracts have the risk of being inefficient if not every tenant will want and value cable service. Moreover, long-term quantity contracts involve a similar potential for anticompetitive effects. Alternatively, an MDU owner could subsidize a PCO's investment in its building to reduce the PCO's exposure to an acceptable level. There are two problems with this idea. The first is that it actually does not have any effect on the MDU owner's incentive to allow inefficient over-building (i.e. the incentives in the above example would not change if the MDU owner had subsidized the PCO's initial investment). Second, the MDU may see little or no direct benefit from encouraging the PCO to come into the building (i.e. in the above example, the MDU owner sees no benefit given that he will be allowing the cable franchise operator into the building anyway.) Finally, one mechanism that can curb the MDU owner's incentives for inefficient over-building is for the MDU owner to receive a large share of the PCO's subscriber revenues (this works because the cable franchise operator is now taking some of the MDU owner's revenue stream when it enters the building.) In fact, MDU owners do often receive a share of the PCO's subscription revenue stream. However, this share is typically quite small (on the order of 5-10%); too small to really matter for the MDU owners incentives regarding over-building in any significant way. Moreover, this share cannot be significantly increased without greatly diminishing the incentives of the PCO to invest in keeping service quality high.

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bring. For more on this point, see R. Innes and R.J. Sexton, "Strategic Buyers and Exclusionary

33. In fact, both PCOs and MDU owners seem to be in universal agreement that exclusives are necessary to create an environment in which PCOs are willing to invest in MDUs. Indeed, the comments submitted to the FCC by the Building Owners and Managers Association remarked that "Without the right to enter into exclusive contracts, many building owners would be forced to deal with the incumbent cable operator and no one else." (p. 4) My interviews with MDU owners revealed similar sentiments.

34. Some evidence of the importance of these concerns can be seen by considering the effect that state mandatory access statutes have had on the level of competition in delivery of video programming to MDUs. These statutes mandate that the local franchised cable operator has a right of access in an MDU, and thereby make exclusive contracts with competitors to the franchised cable operator impossible.<sup>12</sup> Anecdotal evidence suggests that PCOs are much less likely to be active in states that have such statutes. Moreover, the responses to the ICTA survey confirm this anecdotal evidence: survey respondents were active in 28 of the 36 non-access states (77%), but in only 5 of the 14 access states (36%). Thus, the inability to write exclusive contracts in access states is associated with a significant reduction in the extent of PCO competition that franchised cable operators face.

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Contracts," *American Economic Review*, June 1994, 566-84.

<sup>12</sup> The presence of these statutes is not exactly equivalent to a ban on exclusive dealing contracts because they also mean that an MDU owner cannot bar the local franchised cable operator from access to its building. But such a difference is unlikely to be of significant relevance in practice, because the difference only matters for the incidence of inefficient over-building in cases in which the franchised cable operator can earn positive profits by entering the MDU or upgrading its service to the MDU following investment by a PCO, but the building owner is made worse off by this entry. The typical case is likely to be that the building owner is at worst indifferent about this entry.

February 1998

## Curriculum Vitae

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Date of Birth: February 3, 1959  
Place of Birth: New York City

### DEGREES

Ph.D. (Economics), Massachusetts Institute of Technology, 1984  
M.B.A. (Finance), Wharton School, University of Pennsylvania, 1984  
B.S. (Economics), Wharton School, University of Pennsylvania, 1980

### ACADEMIC EMPLOYMENT

Harvard University, Professor of Economics, 1991-  
Harvard University, Frederick S. Danziger Associate Professor of Economics, 1988-91  
Harvard University, Assistant Professor of Economics, 1984-88

### VISITING POSITIONS

Department of Economics, Northwestern University, 1997-8  
Antitrust Division, U.S. Department of Justice, April - July 1988  
Department of Economics, Yale University, Fall 1989

### GRANTS, FELLOWSHIPS, PRIZES

National Science Foundation Research Grants, 1986-88, 1990-94  
Alfred P. Sloan Research Fellow, 1990-92  
Fellow, Center for Advanced Studies in the Behavioral Sciences, 1993-94  
Fellow, Econometric Society (Elected in 1993)

## PROFESSIONAL ACTIVITIES

Co-Editor, *RAND Journal of Economics*, 1991-1996  
Research Associate, National Bureau of Economic Research  
Program Committee, Econometric Society Meetings, Winter 1989

## CONSULTING EXPERIENCE

I have been the principal economic consultant in the following matters:

*Starkist/Bumble Bee Merger Investigation* (Dept. of Justice Merger Investigation)  
*Phelan v. Newport Imports* (Price Fixing Case)  
*Ticketmaster Investigation* (Dept. of Justice Investigation of Contracting Practices)

In addition I have worked as a member of a consulting team in numerous other antitrust matters.

## TEACHING

Graduate industrial organization, antitrust, and regulation  
Graduate microeconomic theory  
Undergraduate industrial organization and antitrust  
Undergraduate applied microeconomics

## PUBLICATIONS: BOOKS

1. *Microeconomic Theory*, Oxford University Press, 1995, 981 pp. (with A. Mas-Colell and J. Green)

## PUBLICATIONS: JOURNAL ARTICLES

1. "Moral Hazard, Adverse Selection, and the Optimal Provision of Public Goods," *Journal of Public Economics* (22), October 1983, pp. 49-71.
2. "Common Marketing Agency as a Device for Facilitating Collusion," *RAND Journal of Economics* (16), Summer 1985, pp. 269-81. (with B.D. Bernheim)
3. "Menu Auctions, Resource Allocation, and Economic Influence," *Quarterly Journal of Economics* (101), February 1986, pp. 1-31. (with B.D. Bernheim)
4. "Free Entry and Social Inefficiency," *RAND Journal of Economics* (17), Spring 1986, pp. 48-58. (with N.G. Mankiw)

5. "Common Agency," *Econometrica* (54), July 1986, pp. 923-42. (with B.D. Bernheim)
6. "Coalition-Proof Nash Equilibria I: Concepts," *Journal of Economic Theory* (42), June 1987, pp. 1-12. (with B.D. Bernheim and B. Peleg)
7. "Coalition-Proof Nash Equilibria II: Applications," *Journal of Economic Theory* (42), June 1987, pp. 13-29. (with B.D. Bernheim)
8. "Exit with Multiplant Firms," *RAND Journal of Economics* (19), Winter 1988, pp. 568-88.
9. "Multiproduct Monopoly, Commodity Bundling, and Correlation of Values," *Quarterly Journal of Economics* (104), May 1989, pp. 371-84. (with R.P. McAfee and J. McMillan)
10. "Multimarket Contact and Collusive Behavior," *RAND Journal of Economics* (21), Spring 1990, pp. 1-26. (with B.D. Bernheim)
11. "Tying, Foreclosure, and Exclusion," *American Economic Review* (80), September 1990, pp. 1-26.
12. "The 'Foreclosure' Effects of Vertical Mergers," *Journal of Institutional and Theoretical Economics* (147), March 1991, pp. 207-26. (with P. Bolton)
13. "Patent Expiration, Entry, and Competition in the U.S. Pharmaceutical Industry: An Exploratory Analysis," *Brookings Papers on Economic Activity, Microeconomics*, 1991, pp. 1-48. (with R. Caves and M. Hurwitz)
14. "Entry and Competitive Structure in Deregulated Airline Markets: An Event Study Analysis of People Express," *RAND Journal of Economics* (23), Winter 1993, 445-62. (with S. Collins)
15. "Incomplete Contracts, Vertical Integration, and Supply Assurance," *Review of Economics Studies* (60), January 1993, pp. 121-48. (with P. Bolton)
16. "On the Efficiency of Privately Stipulated Damages for Breach of Contract: Entry Barriers, Reliance, and Renegotiation," *RAND Journal of Economics* (26), Summer 1995, pp. 180-202. (with K. Spier)
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